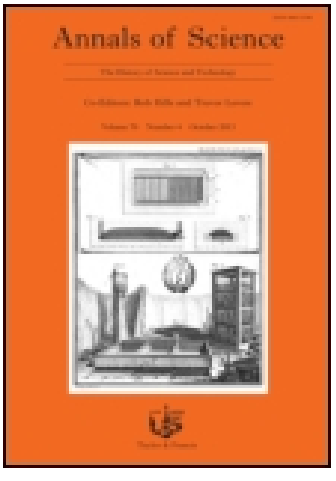
This article was downloaded by: [Temple University Libraries]
On: 24 November 2014, At: 17:51
Publisher: Taylor & Francis
Informa Ltd Registered in England and Wales Registered Number: 1072954 Registered office: Mortimer House, 37-41 Mortimer Street, London W1T 3JH, UK



Annals of Science
Publication details, including instructions for authors and subscription information:
http://www.tandfonline.com/loi/tasc20

Solution to a 440-year-old Zoological Mystery: The Case of Aldrovandi's Dragon

Phil Senter[a], LaRhonda C. Hill[a] & Brandon J. Moton[a]
[a] Fayetteville State University, Fayetteville, North Carolina, USA
Published online: 01 May 2013.

To cite this article: Phil Senter, LaRhonda C. Hill & Brandon J. Moton (2013) Solution to a 440-year-old Zoological Mystery: The Case of Aldrovandi's Dragon, Annals of Science, 70:4, 531-537, DOI: 10.1080/00033790.2013.785729

To link to this article: http://dx.doi.org/10.1080/00033790.2013.785729

PLEASE SCROLL DOWN FOR ARTICLE

Taylor & Francis makes every effort to ensure the accuracy of all the information (the "Content") contained in the publications on our platform. However, Taylor & Francis, our agents, and our licensors make no representations or warranties whatsoever as to the accuracy, completeness, or suitability for any purpose of the Content. Any opinions and views expressed in this publication are the opinions and views of the authors, and are not the views of or endorsed by Taylor & Francis. The accuracy of the Content should not be relied upon and should be independently verified with primary sources of information. Taylor and Francis shall not be liable for any losses, actions, claims, proceedings, demands, costs, expenses, damages, and other liabilities whatsoever or howsoever caused arising directly or indirectly in connection with, in relation to or arising out of the use of the Content.

This article may be used for research, teaching, and private study purposes. Any substantial or systematic reproduction, redistribution, reselling, loan, sub-licensing, systematic supply, or distribution in any form to anyone is expressly forbidden. Terms & Conditions of access and use can be found at http://www.tandfonline.com/page/terms-and-conditions

Annals of Science, 2013
Vol. 70, No. 4, 531–537, http://dx.doi.org/10.1080/00033790.2013.785729

Taylor & Francis
Taylor & Francis Group

Solution to a 440-year-old Zoological Mystery: The Case of Aldrovandi's Dragon

Phil Senter, LaRhonda C. Hill, and Brandon J. Moton

Fayetteville State University, Fayetteville, North Carolina, USA
Email: psenter@uncfsu.edu

Received 12 November 2012. Revised paper accepted 5 December 2012

Downloaded by [Temple University Libraries] at 17:51 24 November 2014

Summary

In his book *Serpentum et Draconum Historiae Libri Duo*, the sixteenth-century Italian naturalist Ulisse Aldrovandi described and illustrated an alleged dragon that had supposedly been killed in 1572. The 'dragon' became famous and was the centrepiece of Aldrovandi's museum. The specimen, a long-necked, long-tailed, scale-covered biped with a thickened torso and a forked tongue, was unlike any currently known bipedal animal and is therefore suspicious. Even so, an explicit description of its true nature has not been published before now. Here we examine Aldrovandi's description and illustration, compare these with extant animals, and conclude that the specimen was a taxidermic hoax. It was made by attaching the forelimbs of a common toad (*Bufo bufo*) to a European grass snake (*Natrix natrix*) the midsection of which had been replaced by that of a fish. Fake dragons abounded in the museums of Renaissance Europe, but only in a few cases has the mystery of their true nature been investigated. Aldrovandi's dragon can now be added to the list of such solved zoological mysteries.

Contents

1. Introduction 531
2. Analysis of the dragon 533
3. Conclusion 536
4. Discussion 536

1. Introduction

The story of the Bologna dragon is a strange and entertaining episode in the history of science. The specimen, a scaly biped, was said to have been killed in 1572 near Bologna, Italy. The Italian naturalist Ulisse Aldrovandi (1522–1605) acquired it and displayed it in his museum, where it attracted large numbers of viewers.[1] The specimen was one of a plethora of faked dragons that Renaissance taxidermists created. Some were made by mutilating cartilaginous fishes, and others were composites of parts of different animals.[2] The Bologna dragon falls into the latter category. Unfortunately, the specimen no longer exists and therefore cannot be examined directly. However, enough clues exist to solve the mystery of its

[1] Paula Findlen, *Possessing Nature: Museums, Collecting, and Scientific Culture in Early Modern Italy* (Berkeley, 1996), 17.
[2] Peter Dance, *Animal Fakes and Frauds* (Berkshire, 1976), 17–36, 57–61.

© 2013 Taylor & Francis

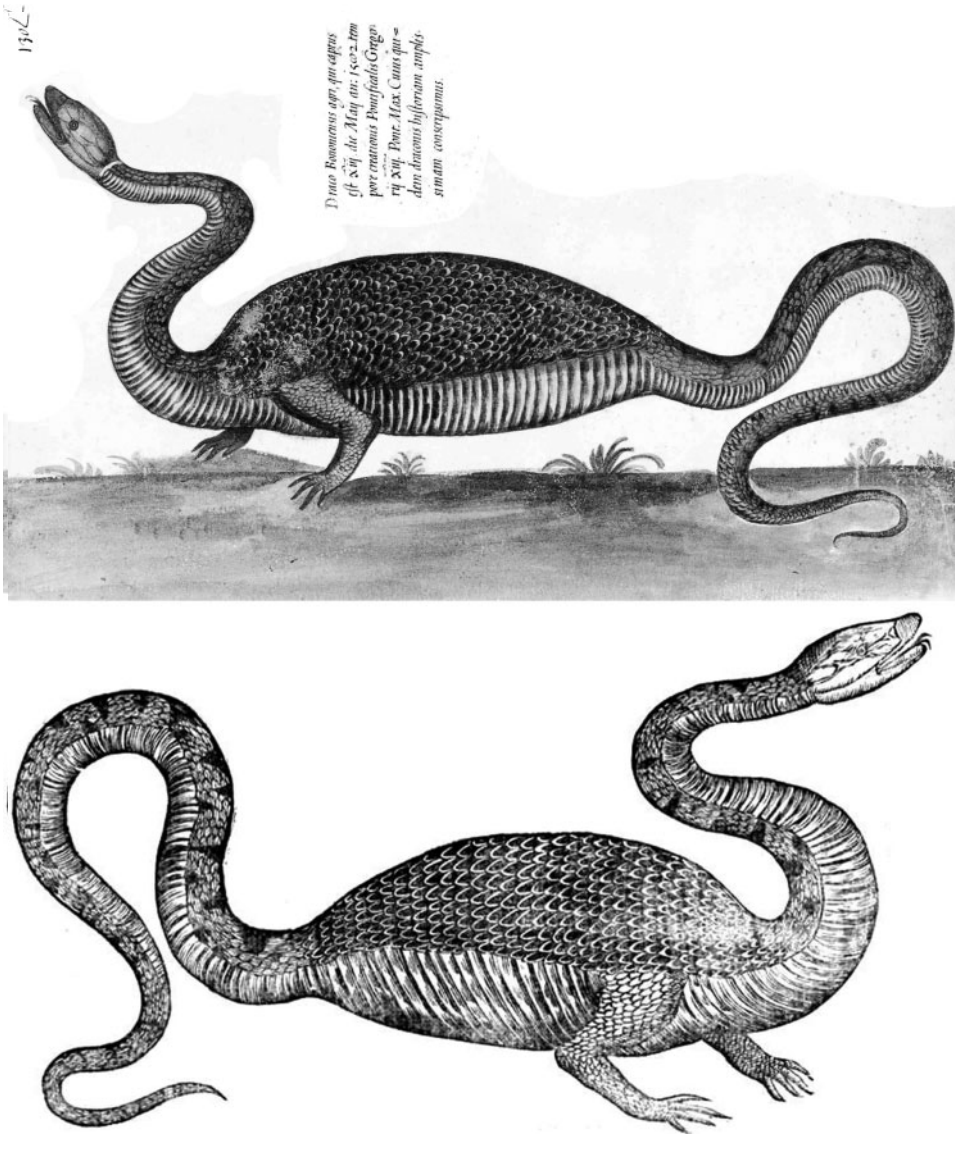


Figure 1. The dragon of Bologna, as illustrated in Ulisse Aldrovandi's *Tavole di animali* (above) and in his book *Serpentum et Draconum Historiae Libri Duo* (below).

construction. Some of these clues are in Aldrovandi's book *Serpentum et Draconum Historiae Libri Duo*.[3] Others are in a painting of the specimen.

Serpentum et Draconum Historiae Libri Duo was published in 1640, thirty-five years after Aldrovandi's death. A major scientific work of its day, it is an encyclopaedic treatise, a review of all the knowledge and folklore that had previously been written on snakes from the biblical world and ancient Greece to Aldrovandi's

[3] Ulisse Aldrovandi, *Serpentum et Draconum Historiae Libri Duo* (Bologna, 1640). A photocopy of the entire book is available online at http://amshistorica.unibo.it/126.

Downloaded by [Temple University Libraries] at 17:51 24 November 2014

day, with a section on each known species. The appearance of the Bologna dragon inspired Aldrovandi to write the book,[4] and of the 427 pages in the book, 117 (27.4%) are devoted to dragons. The dragon section is quite thorough. It includes a subsection apiece on basilisks, Pythian dragons, hydras and winged dragons. Before these sections on specific cases is a 49-page treatment of dragons in general, reviewing several related subjects: figurative use of the term 'dragon' in classical writings; things other than serpents (herbs, precious stones, etc.) with the word 'dragon' in their names or nicknames; dragons in mythology, proverbs, military and family insignia, iconography, and medical and culinary lore; and differences between previous authors' accounts of the attributes of dragons: their length, colour, number of limbs, other physical attributes, habits, birth, country of origin, enemies and venom. Following this lengthy review, which establishes Aldrovandi as an authority on the subject of dragons, is his 15-page description of the Bologna specimen.[5]

Equally important in solving the mystery of the Bologna dragon is a painting of the specimen (Figure 1). Aldrovandi insisted that the illustrators of his works illustrate specimens accurately rather than taking artistic liberties, painting specimens directly when possible instead of painting from descriptions.[6] Aldrovandi's unpublished collection of animal paintings has been given the name *Tavole di animali*, and the painting of the Bologna dragon is painting number 130 of Volume 4 of the *Tavole*.[7] Aldrovandi provided copies of number 130 to those who requested an illustration of the dragon,[8] and a drawing based on the painting appeared in *Serpentum et Draconum Historiae Libri Duo* to illustrate the section on the specimen (Figure 1).

2. Analysis of the dragon

At a glance it is obvious that the fore and hind parts of the Bologna dragon in the painting are those of a snake. The dragon has a slender, forked tongue, a feature unique to snakes and certain lizards. Its ventral scales are transversely elongated scutes, a feature unique to snakes. Several clues enable the species of snake to be identified. The light-coloured collar just behind the head of the Bologna dragon identifies the snake as the grass snake (*Natrix natrix*), a native of Italy and the only European snake with such a marking.[9] The dragon has a dorsal row of small, dark spots, and along each side is a faint row of small, dark spots. These markings and the grey background colour are consistent with the grass snake. The head of the Bologna dragon lacks the characteristic colouration of the grass snake, but this may be a result of damage to the head that removed the scales; according to Aldrovandi, the herdsman who killed the animal did so with blows to the head.

Other attributes of the Bologna dragon are also consistent with the grass snake. Aldrovandi gives the dragon's length as two cubits and the width of its neck anterior

[4] P. Findlen (note 1), 17–8.
[5] U. Aldrovandi (note 3), 401–16.
[6] Giuseppe Olmi, 'Ulisse Aldrovandi', in *The Great Naturalists*, edited by Robert Huxley (London, 2007), 59–62.
[7] The *Tavole* are unpublished in print, but photos of the entire collection are posted online at http://www.filosofia.unibo.it/aldrovandi/pinakesweb/main.asp.
[8] P. Findlen (note 1), 19–20.
[9] Guido Kreiner, *The Snakes of Europe. All Species from West of the Caucasus Mountains* (Frankfurt am Main, 2007), 140–56.

Downloaded by [Temple University Libraries] at 17:51 24 November 2014

to the swollen midsection as two fingers. Measuring rods show that the Roman cubit was 2.9124 English feet (0.437 m), and the Roman measure known as the finger was 0.7281 English inch.[10] This puts the dragon's length at 87.4 cm and its maximum diameter at 4.37 cm. Even if Aldrovandi's listed measurements are estimates, they are reasonable dimensions for a large grass snake. Aldrovandi also mentions that the eye of the dragon was of a golden colour and that its mouth lacked fangs, and the illustrations show that its subcaudal scales were paired rather than single. These attributes are also consistent with the grass snake. The round—as opposed to vertical and slitlike—pupil in the illustrations is also consistent with a grass snake. Although the preservation method used on the specimen is not known, in the experience of the senior author the original shape of a snake's pupil is maintained both in museum specimens that have been preserved in jars of formalin or other preservatives for decades and in unpreserved, putrefying corpses. The roundness of the illustrated pupil is therefore likely genuine. Aldrovandi also described its neck and tail scales as similar to those of a viper. The scales of a viper each have a raised keel down the middle. The only European snakes other than vipers with this trait are the grass snake and other members of the genus *Natrix*.[11]

The enlarged midsection of the dragon could be explained by the taxidermist's having stuffed something into its digestive tract to distend its body. However, it is more likely that the enlarged midsection was produced by replacement of the grass snake's midsection with that of another scaly animal. This is because, although the ventral scutes of the dragon are continuous from neck to tail, among the dorsal scales there is an abrupt change both in size and colour at both the anterior end and the posterior end of the specimen's enlarged midsection. The scales of the midsection are larger than those of the rest of the specimen, and unlike the grey neck and tail scales the scales of the midsection are mainly greenish. It appears that the belly of the grass snake was left intact, but the rest of its midsection was removed and replaced with the torso of a deeper-bodied scaly animal (Figure 2). In his description Aldrovandi mentions that the neck and tail scales resemble those of a viper, whereas 'on the dorsum wide scales appear, emulating the scales of a carp... For the most part these scales are green, but some are reddish, and among them are black'.[12] It is therefore likely that, apart from the belly scutes, the dorsoventrally deep midsection of the dragon is that of an inserted fish torso from which the dorsal fins have been removed. If we accept a total length of 87.4 cm for the specimen and accept the proportions in painting 130, then the midsection—the length of which is 23% of the specimen's total length and the depth of which is 10% of the specimen's length—is 20 cm long and 11.5 cm deep. This is reasonably close to Aldrovandi's description of diameter of the midsection as six digits[13] (13.1 cm). The fish that was used therefore had a torso approximately 20 cm long and a little over 10 cm deep. We can narrow down the identification of the fish by considering only native Italian freshwater fish species of appropriate size, in which the torso is about half as tall as long, with scales of the relative size shown in the painting, and a predominantly greenish hue. Potential candidates are the European perch (*Perca fluviatilis*) and three large members of

[10] Charles Anthon, *A New Classical Dictionary of Greek and Roman Biography, Mythology, and Geography* (New York, 1878), 1027.
[11] G. Kreiner (note 9).
[12] U. Aldrovandi (note 3), 403.
[13] U. Aldrovandi (note 3), 403.

Downloaded by [Temple University Libraries] at 17:51 24 November 2014

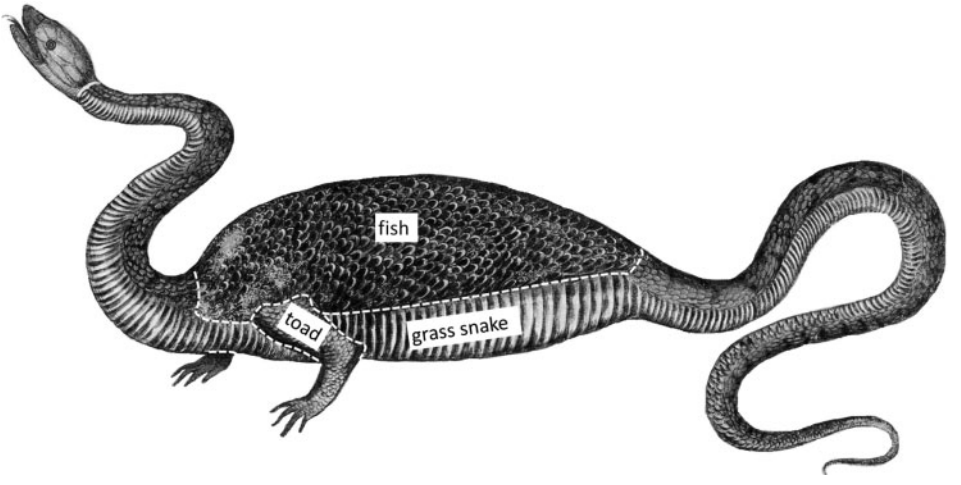


Figure 2. The taxonomic composite that is Aldrovandi's dragon, with its component parts identified.

the carp family (Cyprinidae): the common carp (*Cyprinus carpio*), the goldfish (*Carassius auratus*), and the common chub (*Leuciscus cephalus*).[14] It is difficult to eliminate any of these candidates, although Aldrovandi's mention of black and red highlights is suggestive of some breed of domestic goldfish, a member of the carp family, which is consistent with his statement that the dragon's scales resembled carp scales. Other large enough, green, Italian fish with appropriate bodily proportions include the tench (*Tinca tinca*), northern pike (*Esox lucius*), and brown trout (*Salmo trutta*), but in each case the scales are much smaller relative to the size of the trunk than is shown in painting 130.[15]

The limbs of Aldrovandi's dragon are illustrated as covered in scales that are smaller than those on the snake that makes up most of the specimen. Each limb has four slender, clawless digits, which can be identified as fingers because the direction of the bend at mid-limb indicates an elbow rather than a knee. No scaly European animal has four fingers. European lizards have five fingers per hand (with the exception of two three-fingered species), their fingers are clawed, and most European lizards are too small to have contributed the limbs if the proportions in painting 130 are correct.[16] European amphibians are four-fingered and lack claws, but they also lack scales. However, the forelimbs of the common toad (*Bufo bufo*) are covered in small tubercles that strongly resemble scales. The common toad is found in Italy and happens to be the only European amphibian large enough for its forelimbs to match the size of those in painting 130.[17]

[14] Peter S. Maitland, *Guide to Freshwater Fish of Britain and Europe* (London, 2000).
[15] P. S. Maitland (note 14).
[16] E. Nicholas Arnold, *Reptiles and Amphibians of Europe* (Princeton, 2002).
[17] Arnold (note 16), 73.

Downloaded by [Temple University Libraries] at 17:51 24 November 2014

3. Conclusion

The dragon of Bologna, described by Ulisse Aldrovandi, was a grass snake (*Natrix natrix*) to which was added the torso of a fish and the forelimbs of a common toad (*Bufo bufo*) (Figure 2).

4. Discussion

Aldrovandi did not explicitly describe the Bologna dragon as a hoax. However, several clues suggest that he knew that the 'dragon' was faked. First, he knew that faked dragons existed, as demonstrated by his written note on painting 117 of *Tavole di animali* volume 4 that the painting's subject was a ray that had been carved and sculpted into the form of a dragon by a *circulatoribus* (a joker or charlatan). Second, veiled references in his description show that, for those who could read between the lines, Aldrovandi had not been fooled by this taxidermic fraud: (1) He mentioned that the specimen was unlike any animal that had ever been seen before,[18] so he was aware of its uniqueness. (2) He repeatedly likened its fore and hind ends to those of a snake, and he likened the skin of its midsection to a fish,[19] revealing that he knew what the skin of each 'should' look like. (3) He specifically likened the specimen's white collar to '*Natricis torquatae*' ('a grass snake's collar').[20] (4) He introduced absurdities that the unlearned might not catch but that an astute naturalist would. For example, he stated that the dragon was revealed to be a juvenile because, just as teeth that had not yet erupted were characteristic of juveniles, so in the dragon the nails had not erupted;[21] as a meticulous observer of nature, Aldrovandi certainly knew that the nails are fully erupted in newborn mammals and newly-hatched birds and reptiles and that unerupted nails are therefore not relevant to the question of age. He also included the absurd statement that the sharp tail could be used as a defensive sting, as in the scorpion.[22] In addition, he made the nonsensical assertion that the feature that identified the specimen as a dragon was the green colour of its dorsal scales.[23] Taken together, the absurd statements indicate that Aldrovandi wished to show that he knew what the specimen actually was, but his subtle approach indicates that there was some reason not to state this outright.

Why did Aldrovandi not explicitly reveal the hoax? It is plausible that to do so would have been to make the specimen less exciting and therefore less of an attraction for his museum and his work. In addition, contemporaneous politics may have made such a revelation unwise. The 'dragon' made its appearance near the hometown of Ugo Buoncompagni on May 13, 1572, the very day that Buoncompagni became invested as Pope Gregory XIII.[24] Because in Europe dragons had long been symbols of evil with religious overtones, this was an evil omen regarding the new Pope. The timing of the specimen's appearance therefore raises the possibility that the fraud was commissioned by enemies of Buoncompagni who sought to discredit his religious authority in the eyes of the superstitious public. After making the bold decision to describe the dragon, Aldrovandi therefore had to walk a treacherous tightrope.

[18] U. Aldrovandi (note 3), 401.
[19] U. Aldrovandi (note 3), 403.
[20] U. Aldrovandi (note 3), 403.
[21] U. Aldrovandi (note 3), 403.
[22] U. Aldrovandi (note 3), 403.
[23] U. Aldrovandi (note 3), 403.
[24] Findlen (note 1), 17.

Downloaded by [Temple University Libraries] at 17:51 24 November 2014

A single misstep could have cost him favour with the Pope, the Pope's enemies, or the scientific community. Aldrovandi's strategy was brilliant and carefully executed. By describing the 'dragon' as a natural animal, he minimized its significance as a supernatural omen, thereby maintaining favour with the Pope by diminishing a potential challenge to his religious authority. By not identifying the specimen as a hoax, he avoided precipitating an investigation that could have exposed the papal enemy or enemies who had commissioned the fraud, and so he avoided making himself a target for revenge. By peppering his description of the specimen with oblique references to the nature of its construction, he avoided diminishing his reputation as a knowledgeable naturalist by cleverly showing similarly knowledgeable readers that he knew what the specimen actually was.

If, for financial or political reasons, Aldrovandi knowingly treated a fake beast as if it were real, he was not alone in having done so. The Bavarian physician Johannes Faber, a brilliant anatomist and naturalist, included a description of a 'dragon' in a volume on natural history.[25] The accompanying illustration shows an obvious taxidermic composite that includes a mammalian skull, but Faber described the specimen as if it were a real animal, to stay in the good graces of his patron, Cardinal Francesco Barberini, the specimen's owner.[26] Another example is the 'dragon' skeleton that civil engineer Cornelius Meyer exhibited in Rome in 1691.[27] This may have been part of an attempt to assure locals that his swamp-draining project would not resurrect the dragon that was rumoured to have been killed there thirty years previously,[28] by proving that it was still dead. The skeleton was a composite that included the skull of a dog, the mandible of a second dog, the forelimbs of a bear, and fake wings.[29] Dance lists several other examples of faked dragons from Renaissance Europe.[30] A comprehensive review of such fakes would fill a book. In some cases, their component parts have been identified, and in other cases they remain mysterious. In the case of Aldrovandi's dragon, we can now say that the mystery has been solved.

Acknowledgements

We would like to thank Sherrice Allen (Fayetteville State University), who served as coordinator for BIOL 430, an undergraduate research course under the auspices of which this project began.

Downloaded by [Temple University Libraries] at 17:51 24 November 2014

[25] Johannes Faber, 'Dracunculus Monoceros', in *Rerum Medicarum Novae Hispaniae Thesaurus Seu Plantarum Animalium Mineralium Mexicanorum Historia*, edited by the Lyncean Academy (Rome, 1651), 816–28.

[26] David Freedberg, *The Eye of the Lynx. Galileo, His Friends, and the Beginnings of Modern Natural History* (Chicago, 2002), 364.

[27] Cornelio Meyer, *Nuovi Ritrovamenti Divisi in Due Parti* (Rome, 1696), illustration on title page and illustration on unnumbered last page.

[28] George C. Kirchmeyer, 'On the Dragon', in *Un-natural History, or Myths of Ancient Science, Volume 3*, edited by Edmund Goldsmid (Edinburgh, 1886 translation of 1691 text), 15–36.

[29] Phil Senter and Pondanesa Wilkins, 'Investigation of a claim of a late-surviving pterosaur and exposure of a taxidermic hoax: the case of Cornelius Meyer's dragon', *Palaeontologia Electronica*, 16(1.6A) (2012), 1–11.

[30] P. Dance (note 2).